The National Park Service
Teacher Ranger Teacher Program

School of Education
& Human Development
UNIVERSITY OF COLORADO DENVER

Gateway National Recreation Area: the Oasis of NYC

Water Quality Mystery Activity

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TRT 2013

Gateway: the Oasis of NYC
Water Quality Mystery Activity
Teacher's Guide
by Jennifer Porcheddu TRT 2013

Dear Colleagues,
The purpose of this activity is to teach students about the variety of aquatic ecosystems found in NYC, specifically at Gateway National Recreation Area. However, the classroom portion of this activity can be used anywhere, as long as you can provide water samples from a few locations (your friend's house by a lake, from two locations on a creek: near and far from a farm, the classroom aquaria, etc...).

The potentially pricey part of this activity is the water quality testing equipment. I use standard aquarium testing kits, such as API's or Instant Ocean Liquid Master Test Kits, as well as a plastic hydrometer.

I designed this activity to begin in the classroom, and the extension activities allow the students to explore Gateway National Recreation Area (or your local ecosystems) armed with some knowledge of the ecology of the area.

I have included:
a) summary of the lesson in the Understanding by Design template.
b) specific instructions to present this lesson.
c) a powerpoint to use in the classroom and guide you through the activity.
d) student worksheet for recording data.

Sequence:

Day	Activity	Materials	Goals
1	Demo water testing equipment. Let each group try it out on tap water. Discuss measurements (ppt, ppm). Describe the sources of each factor being tested (salinity, pH, nitrate, nitrite, ammonia).	Water test kits, hydrometer. Tap water sample.	SWBAT use water quality testing equipment.
2	Students solve mystery: predicting where each sample was collected (detailed lesson attached)	Water test kits, hydrometer, PPT, samples from locations marked only with a letter.	SWBAT apply knowledge of water quality parameters to make predictions about water sources.
3	Students research animals likely to be found in each location based on parameters tested	Computer access.	SWBAT investigate how environmental factors determine the flora and fauna of an area.
4	Students and teacher visit locations to seek plants and animals and compare biotic and abiotic factors at each location.	Seining equipment, buckets, field guides, binoculars, nets.	SWBAT to collect and analyze field data, and perhaps create sampling protocols.

Teacher's Guide

1. Begin by purchasing and familiarizing yourself with the hydrometers and water test kits you will be using. You will need enough for each group. Typical group size is 3-5 students.
2. During the first lesson, you will teach the students how to use the test kits, and you will teach them about pH, salinity, ammonia, nitrate, and nitrite using the PowerPoint provided (or your own resources). You can use tap water or aquarium water for this part of the activity.
3. For the second lesson. You will need to collect water samples from various locations. If you are local to the area, you should collect from the locations I have indicated on the map, because I give background info on these in the Powerpoint.

**If you collect elsewhere, you should get both fresh and saltwater samples. Additionally, you should test your samples in advance because if the samples are too similar, this activity won't work.

4. Fill a one liter bottle with water from each location. You will need a bucket on a string. Expect to get wet, particularly at the beach.
5. Label each bottle with only a letter, and make note of where each came from for your own recollection.
6. In the classroom: Show a map of the area where the samples were collected. Display the water samples for all to see.
7. After discussing the features of each location, students will hypothesize (based only on appearance or scent) where each sample came from.

The sample locations are marked with a NUMBER, the bottles themselves are marked with a LETTER (The kids are supposed to predict:"Sample A came from location 3", etc...)

8. Next, have each group examine their supplies and carefully read through the worksheet.
9. You will now provide each group with one sample of water. They will conduct all tests for that sample, and write the results in the proper column on the board.
10. All groups will write all data onto their worksheets.
11. Discuss with the class the differences between the samples. Try to have them think critically about WHY there is more nitrate (for example) in one location, or how a higher salinity might impact the types of wildlife present.
12. Have students complete the questions on the worksheet.

Try out the extension activities on the previous page!